

Money and the Natural Rate of Unemployment

Finn Ostrup



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1 Introduction

1.1 The aim of the book

It is a common view among economists and policy makers that money has no impact on production in the longer term characterised by full price and wage flexibility and expectations which are formed rationally. This view gained acceptance at the end of the 1960s and the beginning of the 1970s when the concept of an exogenously determined rate of natural unemployment became dominant in economics.

This book aims to present a new view in the discussion of monetary policy and monetary regimes. The book presents a number of new mechanisms, not previously discussed in the literature, which imply that money affects long-term production. This finding of a monetary impact on natural production is important from a policy perspective. The authorities lose the capability of affecting long-term production if they give up the possibility of using monetary policy, for example, by establishing an independent central bank or by joining a monetary union, or if they give up the possibility of choosing a monetary regime.

By a monetary impact on production we understand that either: (i) inflation affects production, inflation being determined through growth in the money supply and thus being controlled by the authorities; or (ii) production is affected by factors which are influenced by the monetary regime, implying that production is changed when there is a shift in the monetary regime. In some of the models which are presented throughout the book, we reach the further conclusion that long-term production can be affected by other instruments controlled through monetary policy, for example sterilised intervention, the central bank's reserve policy, and capital restrictions.

The point of departure of the analysis is essentially 'classical'. All models throughout the book are based on an economic structure with the following assumptions: (i) all economic relationships result from

agents' optimisation; (ii) the stochastic distributions of variables or, in the case of non-stochastic models, the actual outcomes of future values of variables are known by the agents in the economy, that is, expectations are formed rationally; (iii) the preferences of economic agents are based only on real variables; and (iv) there is perfect price and wage flexibility, implying that there are no costs associated with the adjustment of nominal variables. The third assumption (iii) means that we exclude concepts like wage illusion which would cause wage setters to place an emphasis on the nominal wage. The fourth assumption (iv) implies that we ignore costs associated with changes in prices or in the nominal wage. This last assumption has played a major role in recent New Keynesian theory.

Most analyses are based on a wage formation process which implies a relationship between the real wage and employment. This is the case when a trade union optimises preferences which include both the real wage and employment for the members of the union. A relationship between the real wage and employment arises, however, also from a number of other wage formation processes, for example when a firm sets the nominal wage but incurs costs associated with the turnover in staff, see Phelps (1994). The findings throughout the book therefore do not depend on trade union wage setting.

We refer to the production and employment levels which result from agents' optimisation as, respectively, natural production and natural employment. In the analysis of a monetary impact on long-term production we are concerned with steady-state equilibrium. Steady-state equilibrium is defined by two features: (i) there is a constant production growth rate, and (ii) financial variables lie at unchanged levels relative to nominal production in each time period.

1.2 Channels for a monetary impact on natural production

This section briefly presents the various channels, analysed throughout the book, which cause a monetary impact on natural production. In the discussion of these channels, a distinction is made between the case where the authorities' setting of monetary policy instruments is exogenous and the case where long-term production is affected by variables which are specific to the monetary regime, implying that natural production changes with a shift in the monetary regime.

In the case of an exogenous economic policy, it will be demonstrated that inflation or factors determined by the monetary regime affect natural production through the following channels:

- (1) Inflation affects the real return on a domestic currency asset when there is imperfect substitution between financial assets denominated

in different currencies. The real return on domestic currency assets affects capital formation and the demand for goods which influence the combinations of the real wage and employment that can be reached by the wage setters and through this natural production. In addition, monetary policy affects natural production through capital restrictions and sterilised intervention.

- (2) Inflation affects the real bank lending rate and through this the demand for goods and capital formation when banks operate in markets for lending and deposits which are characterised by imperfect competition and when one of the following three conditions is met: (i) banks incur a cost due to asymmetric information when they raise finance on an internationally integrated securities market; (ii) banks regard investment in securities and lending as imperfect substitutes, for example due to different risk characteristics; or (iii) there are economies of scope between bank deposits and bank lending. The real bank lending rate affects capital formation and the demand for goods which influence the combinations of the real wage and employment that can be reached by the wage setters and thus natural production. The authorities can further affect natural production through the reserve policy *vis-à-vis* banks. Moreover, inflation affects the banks' real profitability and thus the incentive to expand bank lending when there is imperfect competition in the market for bank deposits.
- (3) Inflation influences the household saving decision and thus the demand function for goods which in turn affects natural production when securities function as a substitute for money in rendering liquidity services. Securities and money may, for example, both be used to maintain consumption in the case of unexpected income shortfalls or be used to meet unexpected expenditure needs.

In the case where the authorities' policy setting is determined endogenously from the optimisation of preferences, that is, a model framework corresponding to Kydland and Prescott (1977) and Barro and Gordon (1983a), money is able to affect natural production through the same channels as set out above. In the Kydland–Prescott and Barro–Gordon model framework this means that the authorities' preferences affect natural production, causing a change in natural production if the authorities give up attempts to use monetary policy by joining instead, for example, a monetary union or pursuing exclusively a price stability goal. Besides the channels set out above, we find that the monetary regime affects natural production through the following channels:

- (4) The monetary regime affects natural production when inflation has an impact on the demand for goods and when there is centralised

wage setting, the nominal wage being set by a trade union which includes all employees in the economy.

- (5) The monetary regime has an effect on natural production when fiscal policy influences the demand for goods and through this the combinations of the real wage and employment which can be reached by the wage setters. In this case, wage setting is determined not only by the monetary policy which is expected during the wage contract period, but also by the expected fiscal policy. Natural production thus comes to depend on the authorities' inclination to pursue an expansive fiscal policy. The inclination to pursue an expansive fiscal policy is determined by the extent to which it is possible through fiscal policy to reach production and inflation goals. As the authorities set fiscal policy after the nominal wage has been fixed through contracts, the impact of fiscal policy on production and inflation, and thus the authorities' inclination to pursue an expansive fiscal policy, can be found from a model with a fixed nominal wage, in the open economy a standard Mundell–Fleming model. There are further differences across monetary regimes with respect to the authorities' inclination to use fiscal policy because the extent to which fiscal policy will be used depends on whether it is possible to use the alternative policy instrument, that is, monetary policy. Due to these differences across monetary regimes with respect to the impact of fiscal policy on production and inflation, the monetary regime affects natural production.
- (6) There is an impact from the monetary regime on natural production when the authorities have asymmetric preferences in the sense that they want to bring about price stability while not attempting to reduce the price level. This asymmetry with respect to preferences causes the authorities to pursue both employment and price stability goals at a positive inflation rate while they pursue only an employment goal when price stability has been brought about. This affects the real wage that is expected by the wage setters when they set the nominal wage in advance through contracts and thus affects natural production.
- (7) The monetary regime affects natural production when the uncertainty regarding monetary policy is affected by inflation. Higher inflation may, for example, create stronger pressure to undertake political action and could thus cause a less predictable outcome of the political decision-making process.
- (8) The authorities' preferences with respect to inflation and employment influence production in a fixed-but-adjustable exchange regime in the case where wage setters are unable to foresee a devaluation

with certainty but attach a certain probability to the event that a devaluation will take place at a given level of unemployment.

- (9) The monetary regime influences the fluctuation of economic variables during the wage contract period. The fluctuation of variables has an impact on natural production when the wage setters optimise preferences which are asymmetric with respect to production.

These channels for the impact of money on natural production presented above are additional to those previously discussed in the literature. We find in the literature a discussion of four channels through which money can affect production in a model context characterised by rational expectations, full wage and price flexibility, and preferences based on real variables: (a) when money offers a nominal return, the agent's portfolio choice between money and capital is affected by inflation, implying that inflation has an impact on capital accumulation; (b) inflation tax/seigniorage constitutes a revenue source which reduces the need to resort to other tax sources (taxation of capital and labour income) that affect labour supply and saving; (c) when the use of money gives rise to efficiency gains, inflation has implications for the firm's production function and the household's consumption decision because inflation affects the size of the real money stock; and (d) unexpected one-time changes in the money supply can have lasting effects on the real economy due to hysteresis effects, for example by changing the capital stock.

1.3 Assumptions regarding the wage formation

The channels for a monetary impact on natural production presented above under (1)–(5) are based on the assumption that long-term production is determined on the basis of a wage formation process which causes a relationship between the real wage and employment. This is consistent with a wage formation where a monopoly trade union is seen as optimising preferences with respect to the real wage and employment, see, for example, Layard, Nickell and Jackman (1991). A relationship between the real wage and employment is, however, also consistent with a wage formation where an individual wage earner negotiates the wage with an employer, see, for example, Blanchard and Katz (1997), or where firms set the nominal wage but incur costs associated with the turnover of workers, see Phelps (1994). The same policy findings of a monetary impact on the natural production conclusion can also be reached if we had alternatively chosen to consider a representative agent who optimises utility with respect to consumption and leisure. In this case consumption is also determined by the real wage. The findings throughout this book

are therefore consistent with a range of wage formation processes and do not depend on the assumption of a trade union (see chapter 3).

In the case of channels (1)–(5), money has an impact on natural production because inflation, or variables specific to the monetary regime, affects the wage setters' optimisation with respect to the real wage and employment. The book analyses in particular two channels through which the relationship between real wage and employment, and thus the wage setters' optimisation, can be affected by money: (i) inflation or variables affected by the monetary regime have an impact on capital formation; and (ii) inflation or variables affected by the monetary regime influences the demand for goods function which in turn has an impact on the wage setters' optimisation through the real exchange rate which influences the wage setters' real wage, a real appreciation causing an increase in the purchasing power of wages. Only the second channel (ii) is effective in a small open economy characterised by perfect financial integration, causing the real interest rate to be exogenously determined as the foreign real interest rate. The first channel (i) is present only in a closed economy or in an open economy with imperfect financial integration. In the case of the monetary regime affecting the fiscal policy stance there is a further impact on the wage setters' optimisation due to a direct impact of the tax rate on the real disposable wage.

The other channels set out above causing a monetary impact on natural production, that is, channels (6)–(9) above, are consistent with the view that wage setters optimise preferences which include the real wage and employment. They do not, however, depend on this assumption but are consistent also with wage setting where natural unemployment is determined by wage setters who aim at a fixed, exogenously given, unemployment level when they set the nominal wage in advance through contracts. This is the case when wage setters determine natural unemployment under uncertainty, the expected natural unemployment in this case being determined by the fluctuation in economic variables.

Most analyses assume nominal wage contracts. The presence of nominal wage contracts in a rational model setting may be explained by wage setters who face negotiation costs and who want to derive an optimal real wage–employment trade-off during the contract period when they are faced by unexpected shocks, see Benassy (1995b).

1.4 Microeconomic foundation

In the analyses throughout the book, production is determined through the interaction of decisions made by (i) representative firms which set the production level and determine the capital stock to maximise profit, (ii)

households who determine consumption to optimise inter-temporal utility, (iii) authorities who have at their disposal monetary and/or fiscal policy, and (iv) wage setters who set the nominal wage to reach an optimal trade-off between the real wage and employment. As will be explained in chapter 3, the last assumption (iv) is not necessary as most findings apply also to the cases where an individual optimises lifetime utility with respect to leisure and consumption or where a firm sets the nominal wage but incurs costs associated with the turnover of staff in the firm.

The analysis is based on an overlapping generations model with infinitely lived households. The assumptions underlying this basic model are set out in the appendix which specifies the microeconomic foundation. The overlapping generations framework implies that fiscal policy is effective in affecting production also in the long term analysed in the steady-state equilibrium. This means that Ricardian equivalence does not hold.

1.5 The structure of the book

The book is divided into four parts. *Part I* discusses the most important general assumptions used throughout the book, notably with respect to wage formation, and thus forms an introduction to the subsequent analyses. There is furthermore a non-exhaustive survey of the literature and a brief presentation of the empirical evidence which in several areas support monetary non-neutrality in the long term.

Part II presents those mechanisms for a monetary impact which makes it possible through the choice of inflation or other monetary policy instruments directly to influence natural production. As discussed above, these mechanisms are: (i) imperfect substitution between financial assets denominated in different currencies, (ii) financial intermediation through banks which operate in deposit and lending markets characterised by imperfect competition, and (iii) households and firms derive liquidity services from securities, securities functioning as a substitute for legal tender and bank deposits. It is furthermore examined how one-time shifts in the money supply, assuming a specific economic structure, can cause permanent effects on the capital stock and thus have an effect on natural production.

Part III discusses the impact of the monetary regime on natural production. As discussed above, the following channels are examined: (i) the impact of inflation on the demand for goods in combination with a centralised wage setting, (ii) the impact of the monetary regime on the authorities' inclination to pursue an expansive fiscal policy, (iii) the impact of the authorities pursuing exclusively a price stability goal, want-

ing only to lower a positive price increase while not wanting to bring about an actual reduction in the price level, (iv) the impact of inflation on uncertainty with respect to economic policy, (v) uncertainty in a fixed-but-adjustable exchange rate regime with respect to the authorities' decision on a devaluation, and (vi) the impact of the monetary regime on the fluctuations in economic variables and thus on natural production when wage setters have preferences which are an asymmetric function of production.

Part IV discusses some policy implications. It is argued that the view that monetary policy and monetary regimes have an impact on long-term production levels must lead to a revision of the view that monetary policy should be used exclusively to pursue a price stability goal. The wisdom of imposing fixed rules on monetary policy is further questioned because the optimal inflation–unemployment trade-off may change over time. The microeconomic foundation of the economic analysis is specified in the appendix.